The Role of NGVs in California

Tom Cackette
Air Resources Board

NGVTF Technical Committee Meeting
April 14-15, 2004

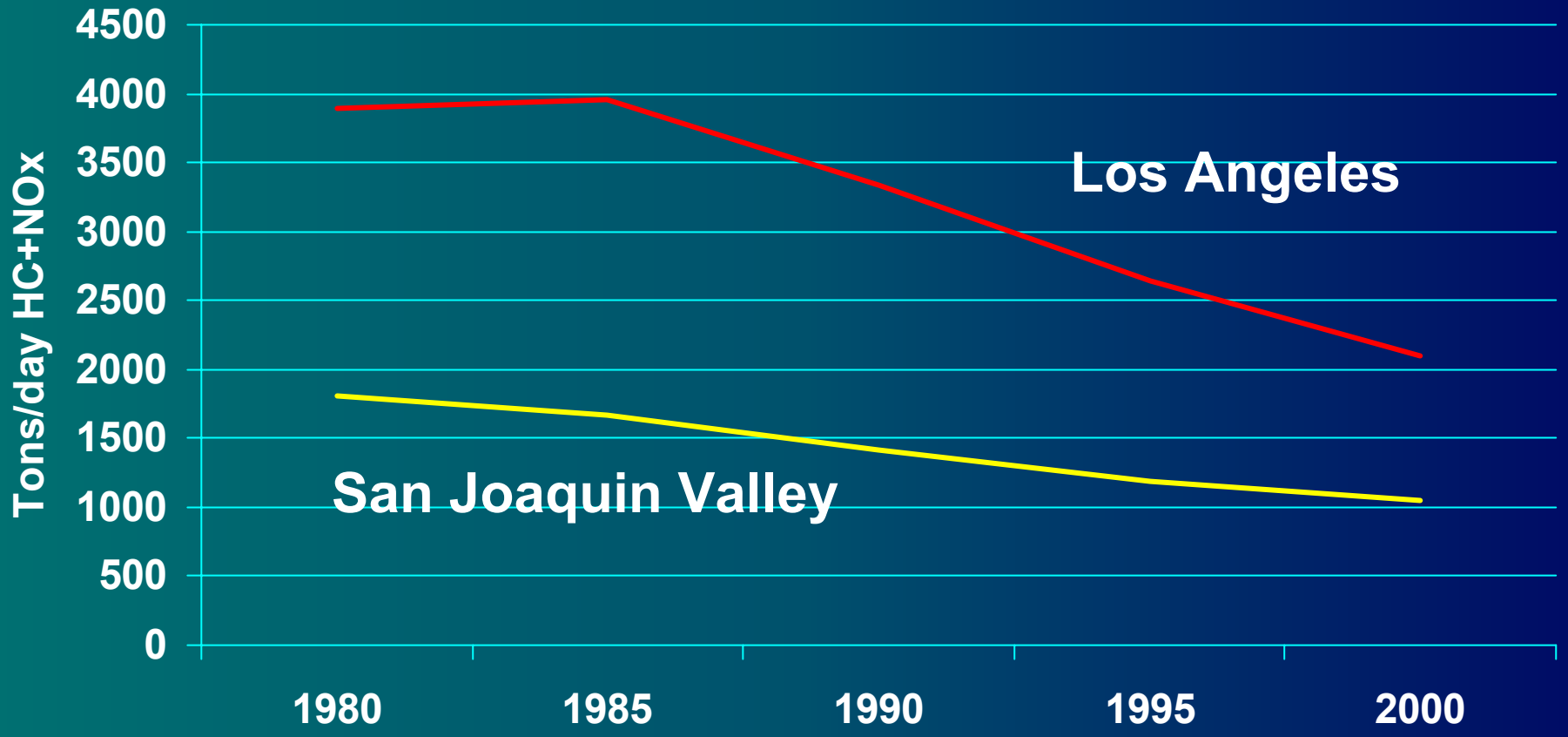
Outline

- Background
- NGV Benefits
- California's Commitment to NGVs
- Current Challenges
- A Pathway to Hydrogen

Outline

- Background
- NGV Benefits
- California's Commitment to NGVs
- Current Challenges
- A Pathway to Hydrogen

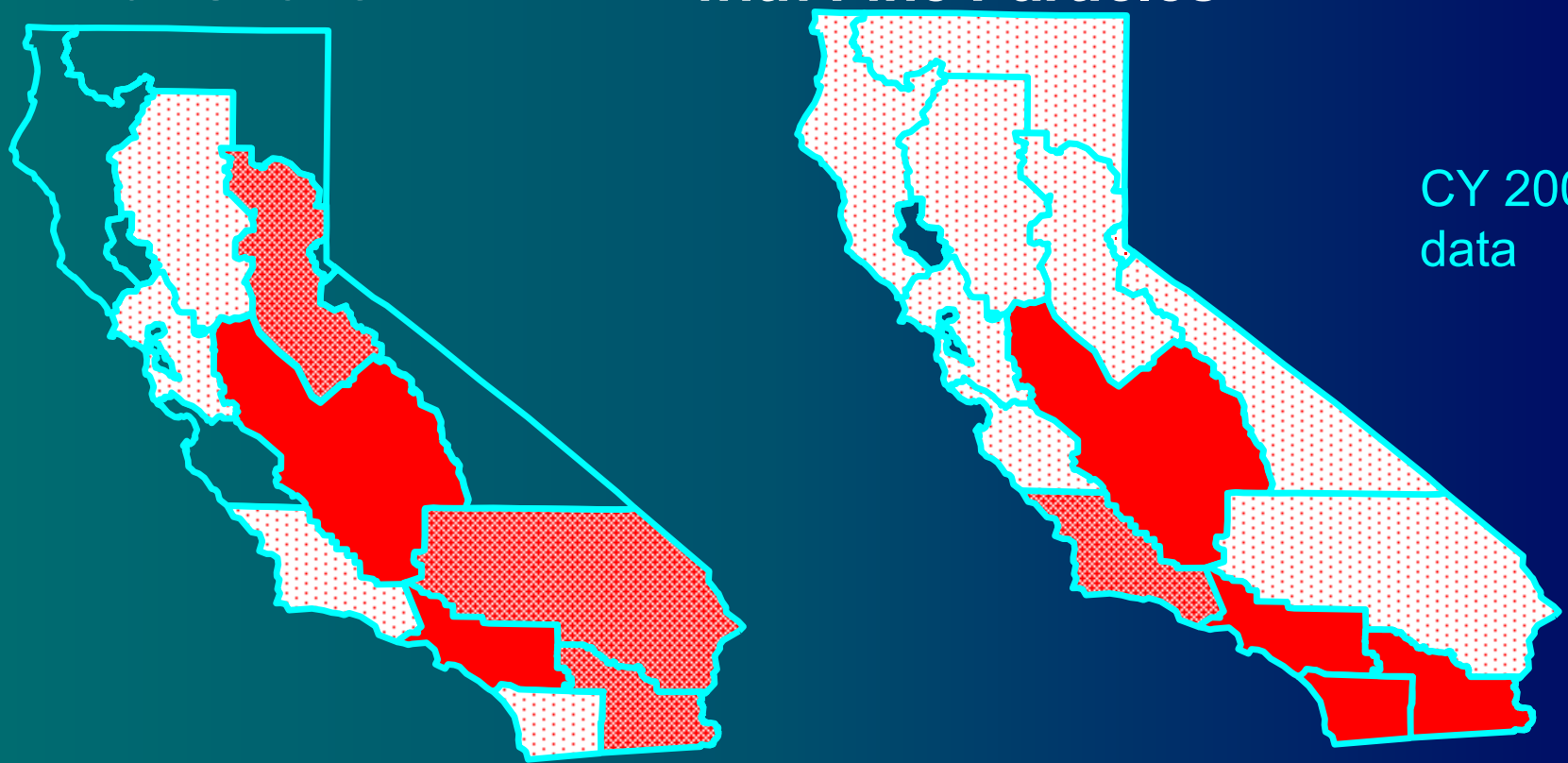
Progress Reducing Emissions



More Improvement Needed: 90% of Californians Breathe Unhealthy Air

Days Air is Polluted with Ozone

Days Air Is Polluted with Fine Particles



CY 2000 data

0-5 Days | 6-50 Days | 50-100 Days | >100 Days

Health Impacts of Air Pollution

- **Annual impacts** (California)
  - 6,500 premature deaths
  - 9,000 hospital admissions
  - 1,700,000 respiratory and asthma attacks
  - 1,300,000 school absences
  - 2,800,000 lost work days

- We are all part of a 'vulnerable population' at some point in our lives

Outline

- Background
- NGV Benefits
- California's Commitment to NGVs
- Current Challenges
- A Pathway to Hydrogen

NGV Benefits

- Reduces criteria pollutants
- Reduces greenhouse gas emissions
- Reduces petroleum dependence

Reducing Criteria Pollutants with NGVs

- Light-Duty NGVs
  - Dedicated NGVs are inherently cleaner than gasoline vehicles
    - Honda Civic GX certified at near-zero emission is the cleanest non-electric vehicle commercially available today
  - NGVs do not have evaporative emissions

Reducing Criteria Pollutants with NGVs

- Heavy-Duty NGVs
  - Emission controls developed for diesel equipment can be used with natural gas engines
  - Emission controls may not be necessary for HD NGVs to meet certain off-road standards
    - Emissions won't increase due to emission control deterioration

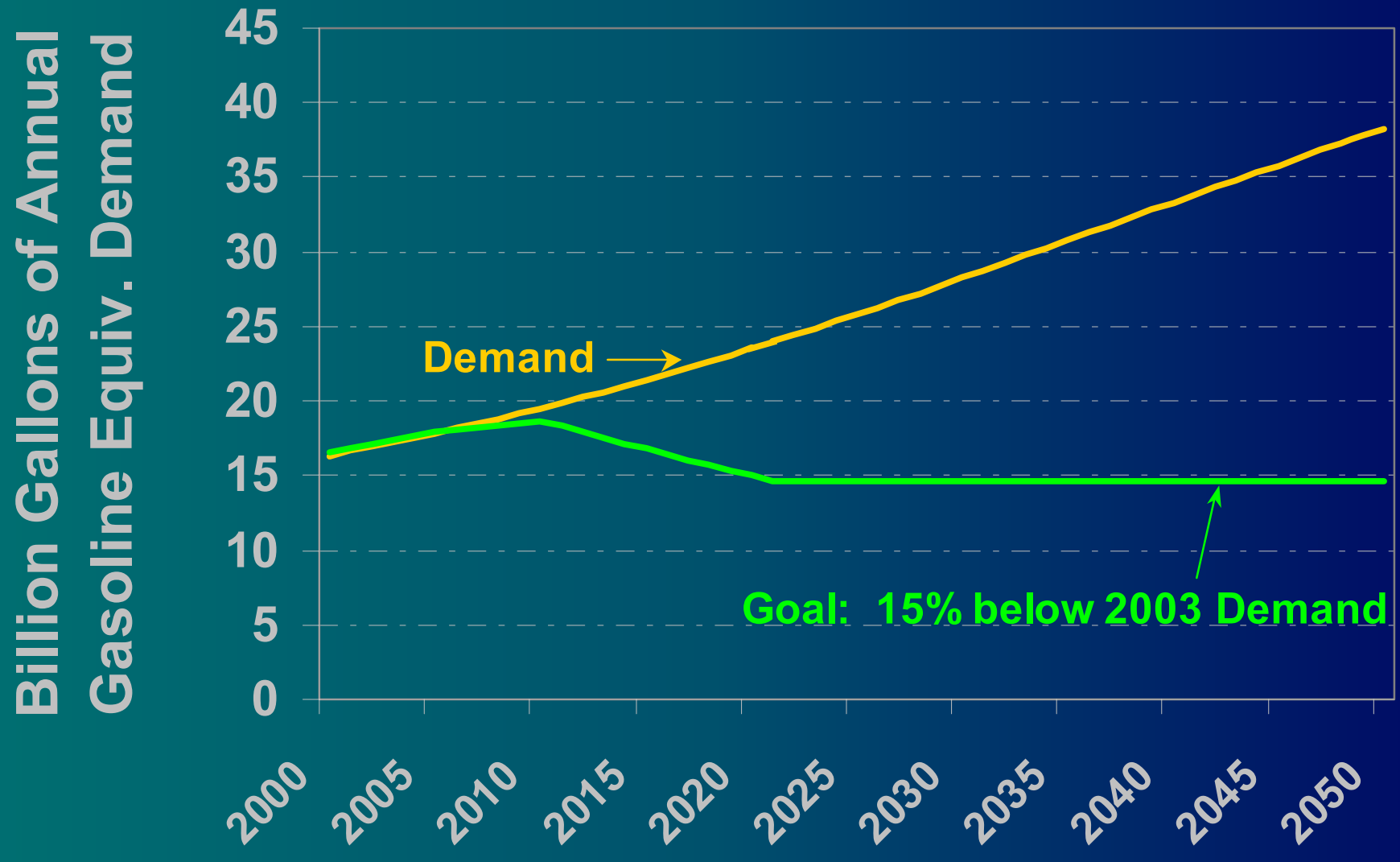
Reducing Greenhouse Gases with NGVs

- Pavley bill (2002)
  - Reduce greenhouse gas emissions from new cars and SUVs beginning with MY 2009
- Dedicated NGVs can reduce carbon dioxide (CO_2) -- the primary transportation greenhouse gas -- by approximately 20-30%

Reducing Petroleum Dependence with NGVs

- **2003 Report to Legislature (AB2076 Shelley)**
  - Recommendation: Establish goal to increase the use of non-petroleum fuels to 20 percent of on-road fuel consumption by 2020 and 30 percent by 2030
  - 87% of natural gas consumed in the U.S. is domestically produced (remaining 13% mostly from Canada)

Reducing Petroleum Dependence with NGVs



Outline

- Background
- NGV Benefits
- California's Commitment to NGVs
- Current Challenges
- A Pathway to Hydrogen

California's Commitment to NGVs

- **Commercialization of NGVs**
  - Approximately 16,000 natural gas LDVs on California roads
  - Approximately 4,000 natural gas HDVs
- **Approximately 230 natural gas refueling stations in California (~ half open to public)**

California's Commitment to NGVs

- State regulations designed to spur clean technology development
  - LEV II
  - Heavy-Duty truck standards
  - Transit bus rule
  - Refuse truck rule

California's Commitment to NGVs

- State incentive programs designed to pay for cleaner technology and infrastructure
  - Lower emission school bus program
  - Carl Moyer program (vehicles and infrastructure)

CNG Heavy-Duty Vehicles

Outline

- Background
- NGV Benefits
- California's Commitment to NGVs
- Current Challenges
- A Pathway to Hydrogen

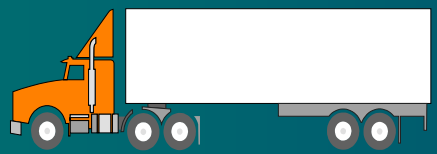
Current Challenges: Less Availability and Diminishing Benefits

- Less availability of NGVs
  - Fewer light-duty NGV offerings from manufacturers
- NGV related costs remains the same but emission advantages have diminished
  - NGV cost-effectiveness decreasing

Current Challenges: NGV Emission Benefits Decrease as Conventional Vehicles Improve

Percent improvement from 1980 to 2007

HC+NOx 93%



NOx+PM 94%

NOx+PM 80%

Outline

- Background
- NGV Benefits
- California's Commitment to NGVs
- Current Challenges
- A Pathway to Hydrogen

NGVs Provide a Pathway to the Hydrogen Highway

- Natural gas is excellent feedstock for hydrogen
  - Methane -- 85% of natural gas-- has highest hydrogen/carbon ratio
- 1.3 million miles of natural gas distribution lines across country
- Familiarity with gaseous fuels (mechanics, fire marshals, general public, etc.)

NGVs Provide a Pathway to Hydrogen Highway

- Natural gas and hydrogen use similar components (e.g., H_2 tanks and NG tanks made by same companies)
- Can combust natural gas or hydrogen + natural gas mixtures in same engine
- Natural gas mitigates startup barriers for hydrogen

Conclusions

- Despite significant improvements in air quality, California must do more to protect the health of its citizens
- NGVs can play a role in future air quality improvements, as well as reducing greenhouse gases and petroleum dependency

Conclusions

- An energy policy that values alternative fuel, fuel diversity and conservation would benefit California and the Nation
- NGVs have momentum in California and their numbers continue to grow as a result of state regulations and incentive programs
- NGVs and associated infrastructure can provide a pathway to hydrogen